



Zero Energy Commercial Buildings Initiative: From Innovation to Deployment

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Alliance to Save Energy



The banner features the text 'CBI' in large white letters on the left, and 'COMMERCIAL BUILDINGS INITIATIVE' in smaller white letters on the right. The background is a blue-tinted image of a modern building facade with a dome and several birds flying in the sky.

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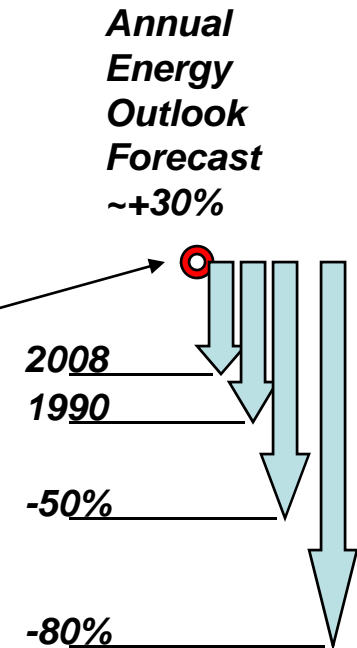
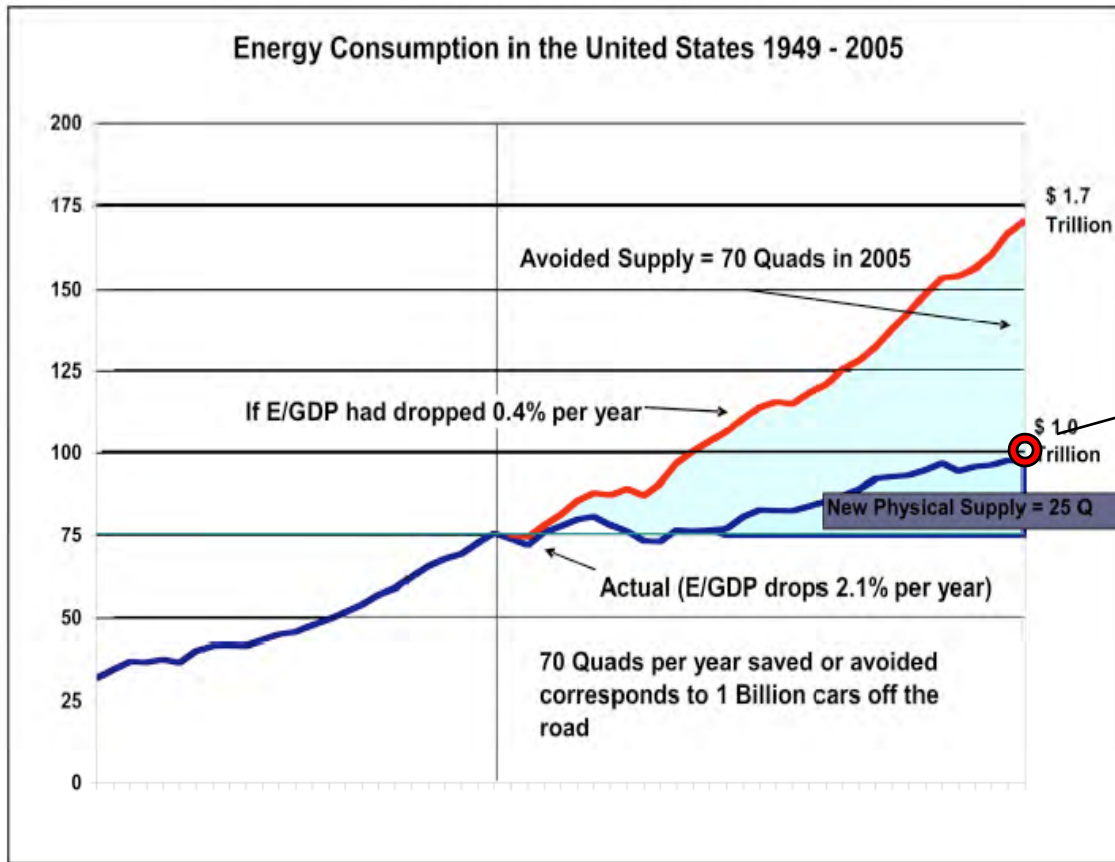
Overview

- Challenge of ZEB commercial buildings
- Developing the CBI initiative
- Strategy
- Organization
- Significance for ASERTTI members



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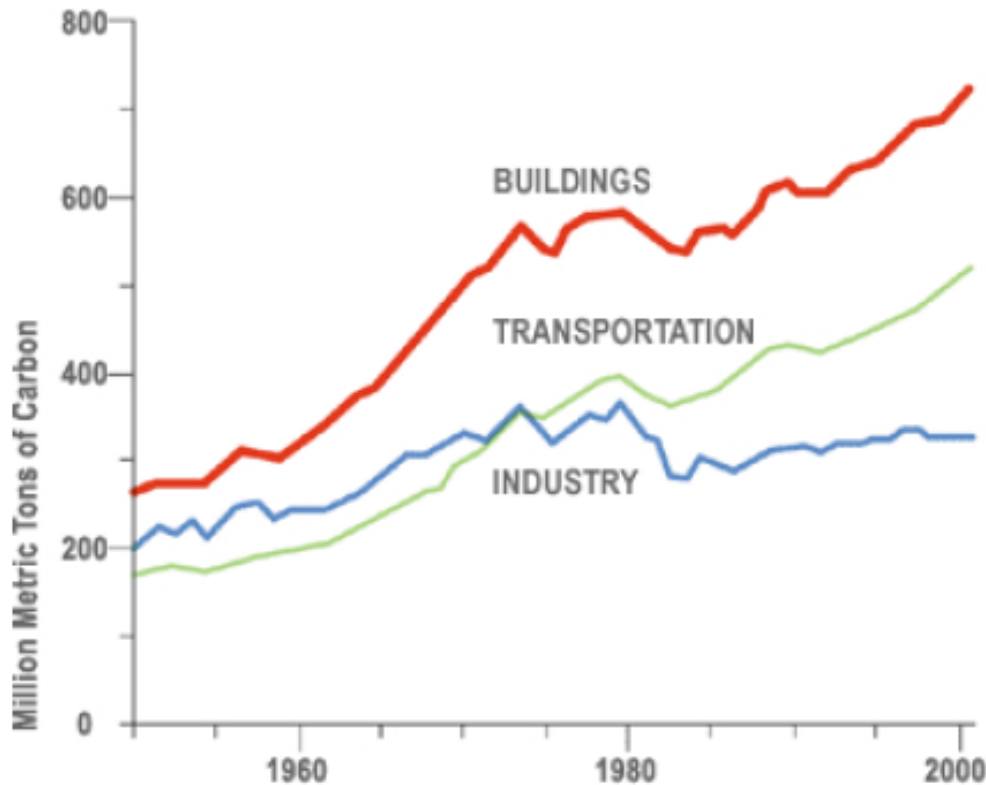
Some Success in Reducing Energy Use, but...



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Buildings Use Most Energy, & Fastest Growth is in Commercial Buildings



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High Performance Buildings

- Oberlin College Lewis Center
 - Oberlin, Ohio
 - goal: zero net site energy use (79%)
- Zion Visitor Center
 - Springdale, UT
 - goal: 70% energy cost savings (65%)



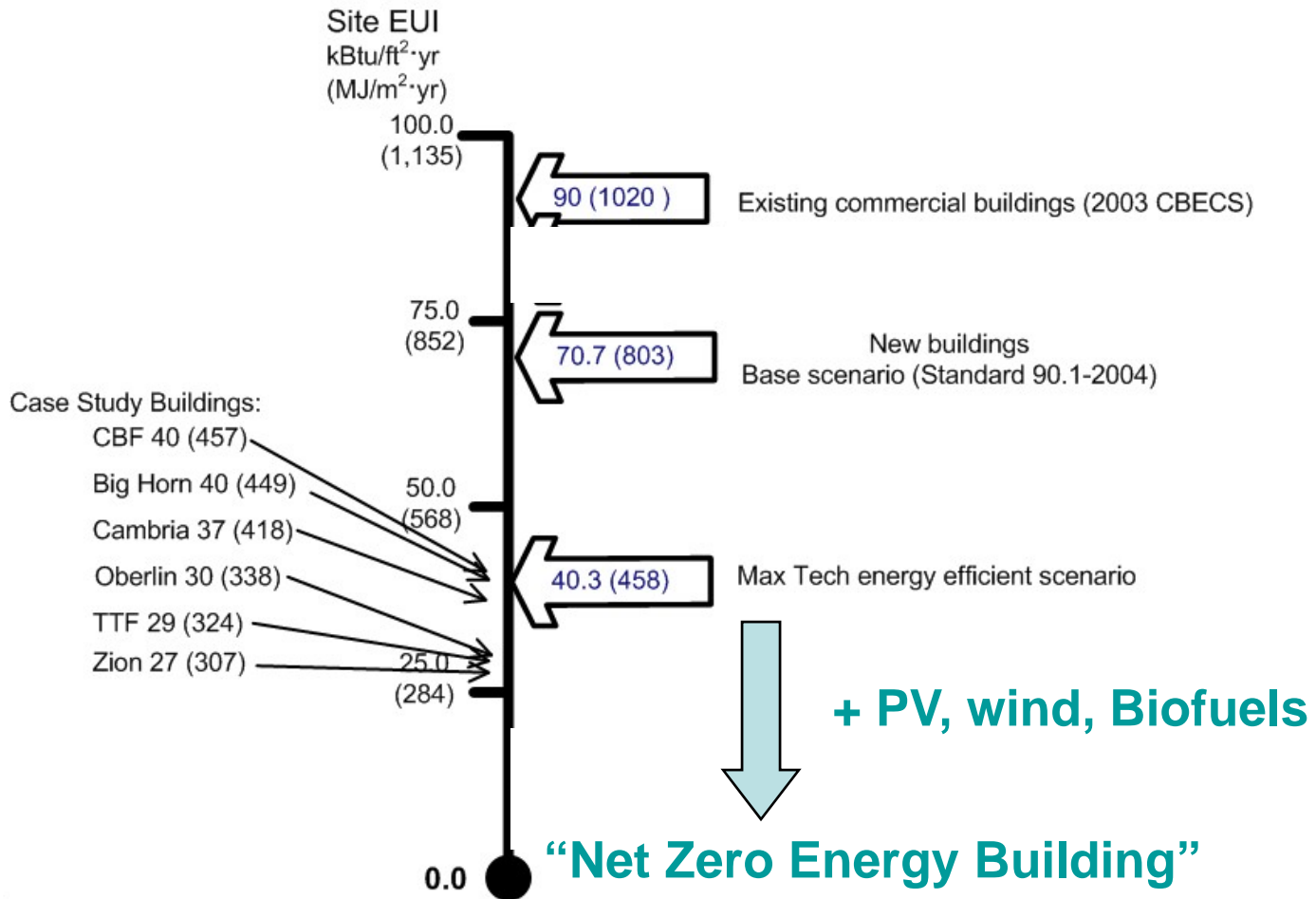
www.highperformancebuildings.gov

- Thermal Test Facility (TTF)
 - Golden, CO
 - goal: 70% energy savings (51%)
- BigHorn Home Improvement
 - Silverthorne, CO
 - goal: 60% energy cost savings (53%)
- Science House, Science Museum of Minnesota
 - St. Paul, Minnesota
 - goal: zero net site energy use (139%)

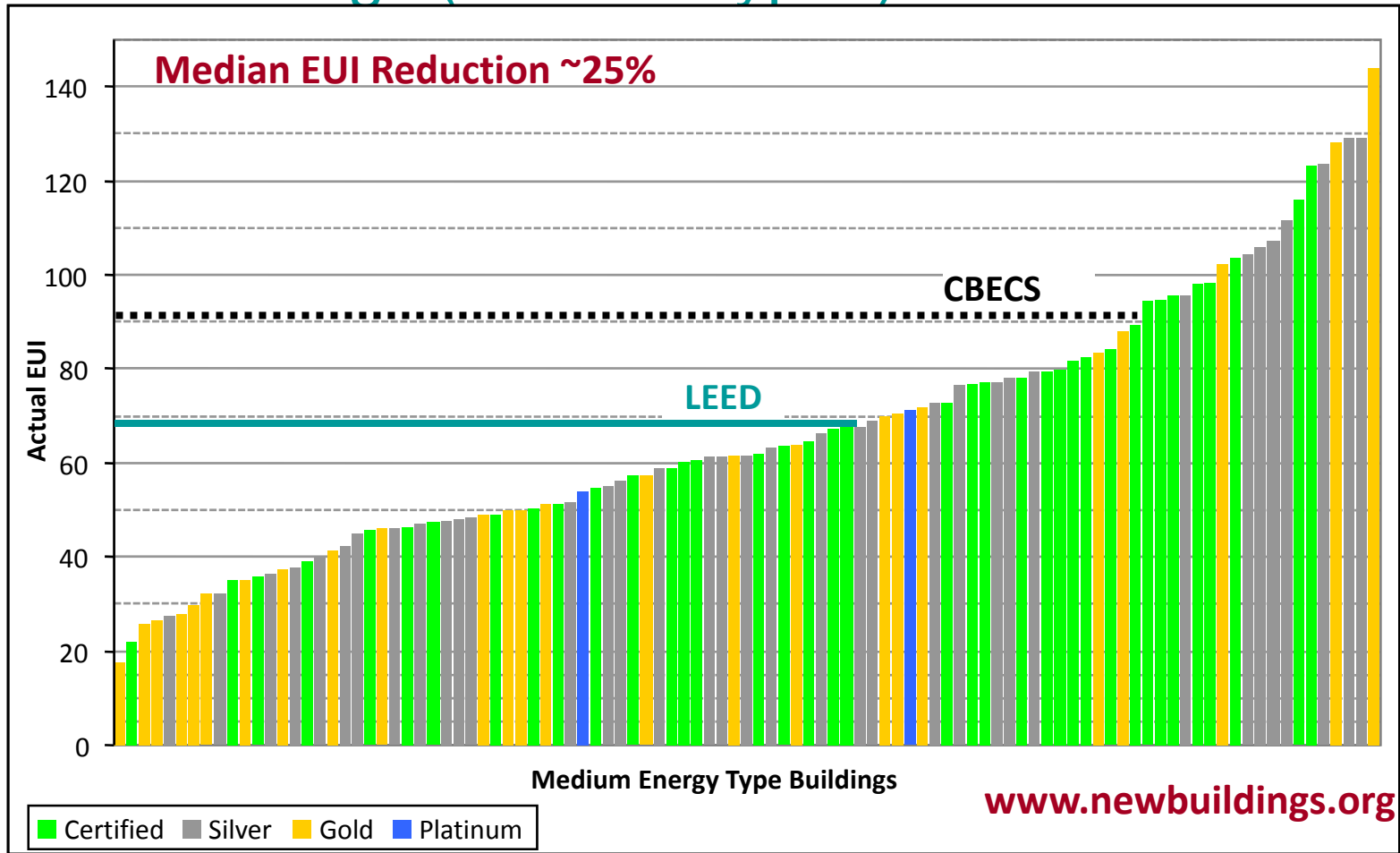


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Building Energy Use vs. CBECS Stock EUI



LEED Buildings (medium types) vs. CBECS Stock



Conclusions

- Massive Reductions in Building Energy Use Needed
- Useful data on current energy use
 - Variety of metrics, snapshots of energy use
- “Net Zero Energy Buildings” as long term goal
 - Interim goals, e.g. 50% savings, etc.
- Very Challenging Goals
 - Technically attainable - a few examples come close
 - Very difficult to achieve large-scale - 100s out of 4.8M
- What will it take to accelerate progress?

Approaching a Zero Energy Future

- ***“The best way to predict the future is to invent it.”***
 - Alan Kay
- ***“If I had asked people what they wanted, they would have said faster horses.”***
 - Henry Ford

Let's Define a Future Vision that is ambitious, gives us what we think we need, not necessarily what is easily achievable



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Origins: 2005 Issues Review

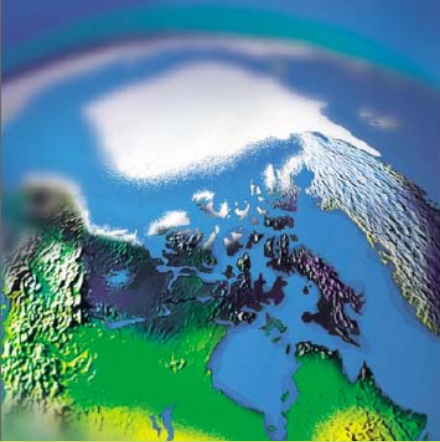
- Clear Vision of What We Need to Do
 - Large and growing interest, U.S. and International
 - Climate change as “new” motivation
 - Zero Energy Buildings is appropriate long term goal
 - “Architecture2030” Challenge (Ed Mazria)
 - Other similar visions; numerous “niche” activities
- Missing:
 - Strategy, Action Plan, Roadmap for ZEB
 - Commitment
 - Resources
 - Broad based organization



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Government of Canada
Action Plan 2000 on
Climate Change

Plan d'action
2000 du
gouvernement
du Canada sur
le changement
climatique



UK Energy Efficiency Action Plan 2007

www.defra.gov.uk



National Action Plan for Energy Efficiency **Vision for 2025:** Developing a Framework for Change

BETTER BUILDINGS THROUGH ENERGY EFFICIENCY: A Roadmap for Europe



A 20-YEAR INDUSTRY PLAN FOR COMMERCIAL BUILDINGS

HIGH-PERFORMANCE COMMERCIAL BUILDINGS A TECHNOLOGY ROADMAP

Developed by:
REPRESENTATIVES OF THE COMMERCIAL BUILDING INDUSTRY

Facilitated by:
OFFICE OF BUILDING TECHNOLOGY, STATE AND COMMUNITY PROGRAMS
ENERGY EFFICIENCY AND RENEWABLE ENERGY • U.S. DEPARTMENT OF ENERGY
FOR MORE INFORMATION, VISIT WWW.EREN.DOE.GOV/BUILDINGS/COMMERCIAL_ROADMAP



ASSESSMENT OF POLICY INSTRUMENTS FOR REDUCING GREENHOUSE GAS EMISSIONS FROM BUILDINGS

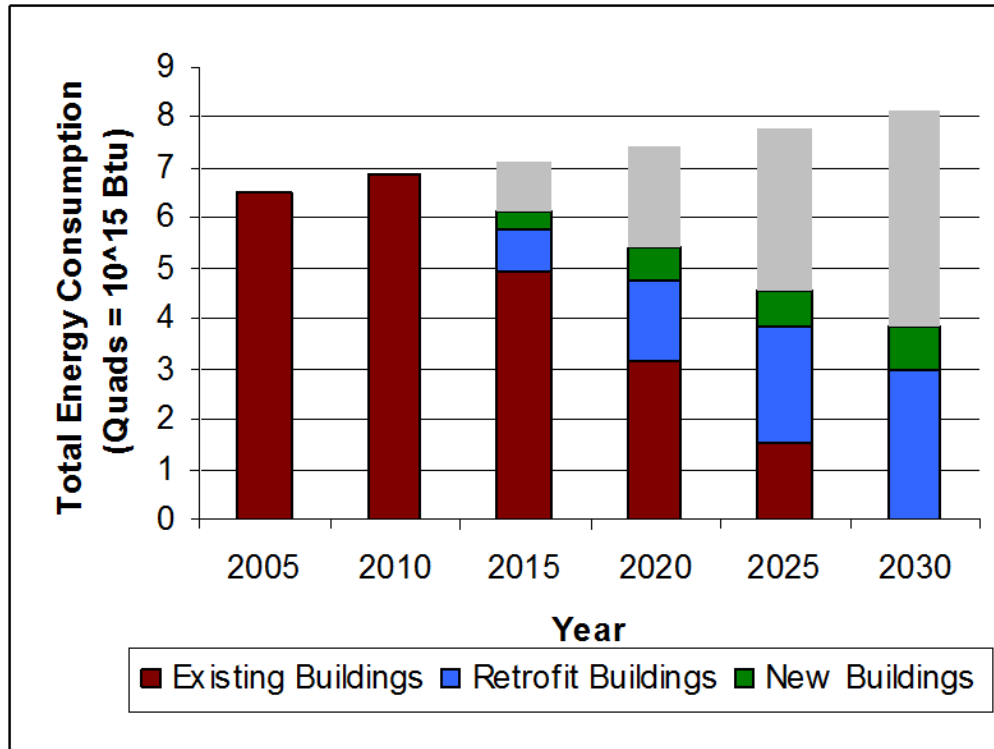
*Summary and
Recommendations*



UNITED NATIONS ENVIRONMENT PROGRAMME



What Might be Technically Achievable?



Business As Usual

These levels of efficiency are unlikely to be achieved by market forces alone

Major new public/private initiatives to drive toward goals

New Commercial Buildings Save 90% by 2030 plus 50% Retrofit Savings by 2030

Key Findings

- **Very large Technical Savings Potentials**
 - Fragmented, risk averse industry, slow progress
- **Must address all building stock**
 - New plus renovation, retrofit, and tune-ups
- **Shift focus from “widgets” to “systems”**
 - Integrated systems, plug-and-play,..
 - “Systems” → new design tools, new construction processes
 - Workforce skills and training needs
- **Building sector strategy must be replicable, extensible**
 - DOE “sector alliances” (Retail, office, schools, etc.)
 - Size matters: 5% of buildings = 50% of floor space
- **Need a regional, climate-sensitive focus**

Findings - 2

- **Need very aggressive changes in energy use**
 - Can't reach goals with prescriptive approach alone
- **Continuum of activities - deployment alone insufficient**
 - Research → Innovate → Demonstrate → Deploy → Standards
 - Not operating in a market “vacuum”
- **Leverage New Market Drivers, Business trends**
 - Green, sustainable design (health, comfort, safety, productivity)
 - Progressive building codes and guidelines
 - AIA, ASHRAE, NBI initiatives
 - Green rating systems (LEED, GreenGlobes, etc.)
 - National Building Information Model (BIM) Standard
 - Distributed generation, on-site power, CHP
 - Demand response, load shedding



“Reality Check” Workshop (Berkeley 10/06)

- October 2006 meeting at LBNL
 - Key industry groups: AIA, ASHRAE, USGBC, WBCSD, real estate, utilities...
 - Surprising consensus: Need more aggressive action
 - Context: Help raise DOE budget for Commercial Buildings
- Focus on “Zero Energy Commercial Buildings”
 - Develop a network, coalition to move this forward
 - Develop an Action Plan
 - Generate funding to enable progress: \$200M/yr
 - Seeds for “Commercial Buildings Initiative”



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CBI Efforts in 2007

- Industry partners agree to move ahead with CBI
- Alliance to Save Energy coordinates DC efforts
 - CBI authorized language in EISA legislation (Sec. 422)
- DOE funded Action Plan development
 - Initial focus on office and retail sectors (interviews)
 - Links to other DOE initiatives
 - **Retail Energy Alliance**
 - **Greening White House**
 - Coordinate with states (CA “Big-Bold” initiative)
 - **~\$1B/year; new comm’l buildings Zero Net Energy by 2030**
 - CBI workshops (11/07 Washington DC; 1/08 NYC)



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Conclusions from Industry Leaders

- Driven by business case
- Organizational support is key
- Seeing positive results
 - Business volume
 - Recruitment
 - Employee satisfaction
- Learned activity
 - Willing to repeat
 - Must be profitable
- Willing to work and take risks



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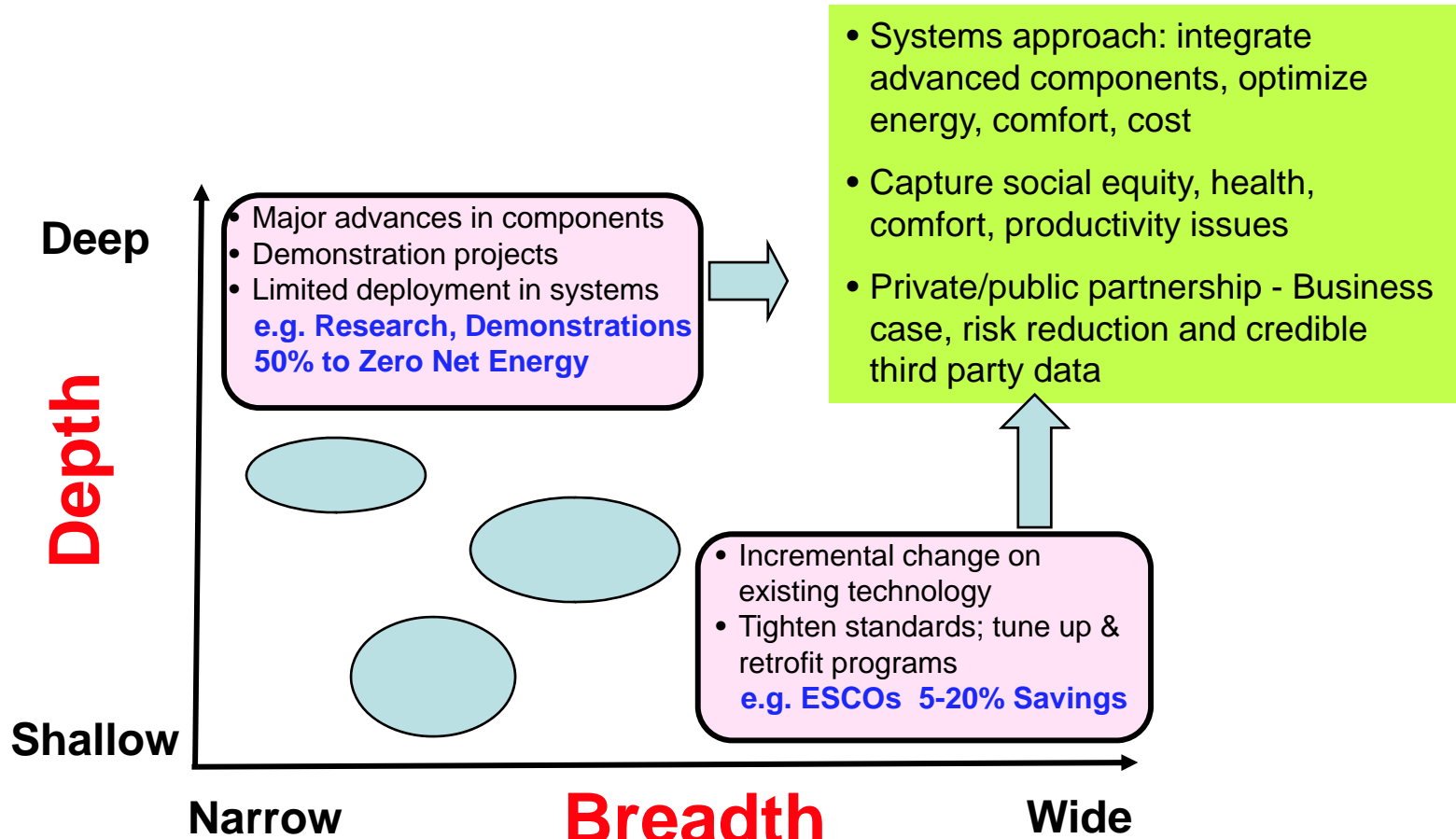
What Do We Need to Do?

- **Take the long view: Aggressive vision for action to 2030**
 - Act to capture the first 20-30% savings now
 - Demonstrate what it takes to get 50% in near term
 - Research what it takes to get 70+% savings in longer term
- **Make performance visible and understandable**
 - “Can’t manage what you can’t measure”
 - More focus on how buildings actually operate
- **Assess, evaluate, act: “Learn by doing”**
 - What works → Promulgate and deploy
 - What doesn’t → Fix and deploy
- **Focus on the facility owner/operator perspective**
 - Drive decision making, investments, and manufacturer offerings



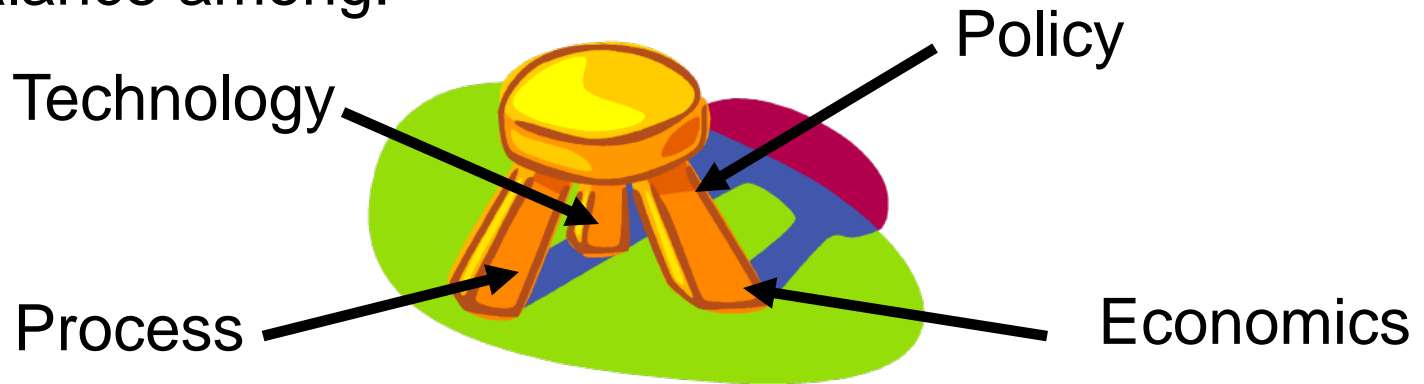
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Conceptual Approach for Achieving ZEB Goals



Need a Comprehensive, Balanced Program

To deliver high performance buildings we must find a balance among:



Program Strategies (preliminary list)

- 1) **Integrated tools & processes - design, construction, operation**
 - Define performance benchmarks
 - Develop design strategies and costs to meet benchmarks
 - Create & demonstrate climate-sensitive, integrated system solutions
 - Construction quality, commissioning, operations, monitoring
- 2) **Financial instruments (value future savings; performance-based compensation)**
- 3) **Tax incentives and utility DSM**
- 4) **Benchmarking & labeling: *Make performance visible* to owners, occupants, public**
- 5) **Codes and standards (new & existing buildings)**
- 6) **Owner-driven alliances for specs, procurement, info-sharing**
- 7) **Education, training, certification, technical assistance**
- 8) **RDD&D for components and systems**

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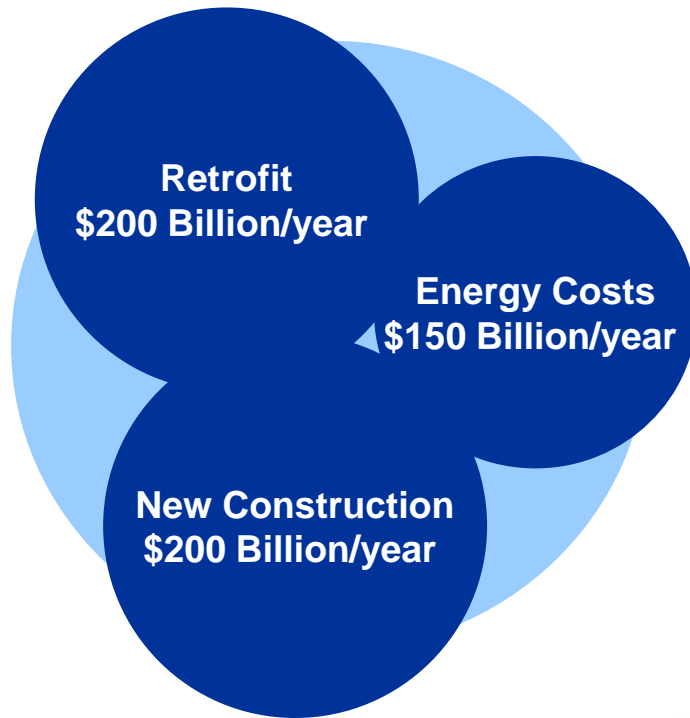
Broad-based Initiative: National ↔ Local, Public ↔ Private

- DOE/EPA/GSA - national leadership but need partners
- R&D programs need deployment partners
 - Deployment funding in state programs, utilities
 - e.g., NYSERDA, California PUC
 - Deployment provides essential feedback for R&D
- Private-Public Partnerships
 - Owners are crucial market drivers
 - Industry suppliers crucial
 - University based training programs....



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Leveraging Financial Resources



Construction Bid Range: 5-15%

“Waste” in Industry: 10-30%

Cost of “green”: 0-5%

Cost of ZEB: 0-20%



Deployment Programs
\$2 Billion/yr



National ZEB Program
\$200 Million/yr



CBI Organization: *“Form Follows Function”*

- What do we want CBI to do?
 - Plan strategically
 - Advise
 - Coordinate; share information
 - Convene
 - Collaborate
 - Initiate
 - Receive, match, & administer funds
 - **Advocate for policies & resources**



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Dysfunctions

- What do we not want CBI to do?
 - Duplicate, discourage or compete with other initiatives (state, regional, utility, private sector)
 - Exclude participation by any organization committed to the goals of high-performance commercial ZEB
 - Narrowly define the problem or the solution (e.g., technology only. Or energy prices. Or mandatory codes/standards...)
 - Sharply separate R&D from deployment



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Participants: CBI as a Big Tent



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Federal Legislation

- CBI authorized in Energy Independence & Security ACT (EISA, Sec. 422) – enacted 12/07
 - Establishes “Zero Net Energy Commercial Bldgs. Initiative”
 - DOE agreement with Consortium to conduct cost-shared:
 - R&D
 - Pilots, demonstrations
 - Deployment & TA on technologies, practices, policies
 - Training for professions & trades
 - Public education
 - Advanced codes development
 - Strategies to overcome split incentives
 - Improved M&V
 - Other RDD&D as needed



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Consortium Members (federal bill language)

- Design & engineering professions
- Development, construction, finance, RE
- Owners/operators (public, private)
- Researchers
- Code-setting
- Independent GB associations
- IAQ and building info system experts
- Utilities
- Manufacturers, distributors
- Public transport
- NGOs



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Next Steps

- Circulate draft Action Plan for review
 - Near-term projects
 - Detailed planning with sectoral Alliances
- Draft MOU
- Recruit charter membership
- Business plan
 - Organization and governance
 - Operating procedures
 - Funding: core, matching, member contributions



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Questions and Discussion!

